

# Telecom Reference Architecture, Part 1

Gopala Krishna Behara, Pradyumna Mahajani, and Prasad Palli

## Abstract

Reference architecture provides needed architectural information that can be provided in advance to an enterprise to enable consistent architectural best practices. Enterprise Reference Architecture helps business owners to actualize their strategies, vision, objectives, and principles. It evaluates the IT systems, based on Reference Architecture goals, principles, and standards. It helps to reduce IT costs by increasing functionality, availability, scalability, etc. Telecom Reference Architecture provides customers with the flexibility to view bundled service bills online with the provision of multiple services. It provides real-time, flexible billing and charging systems, to handle complex promotions, discounts, and settlements with multiple parties. This paper attempts to describe the Reference Architecture for the Telecom Enterprises. It lays the foundation for a Telecom Reference Architecture by articulating the requirements, drivers, and pitfalls for telecom service providers. It describes generic reference architecture for telecom enterprises and moves on to explain how to achieve Enterprise Reference Architecture by using SOA.

## Introduction

A Reference Architecture provides a methodology, set of practices, template, and standards based on a set of successful solutions implemented earlier. These solutions have been generalized and structured for the depiction of both a logical and a physical architecture, based on the harvesting of a set of patterns that describe observations in a number of successful implementations. It helps as a reference for the various architectures that an enterprise can implement to solve various problems. It can be used as the starting point or the point of comparisons for various departments/business entities of a company, or for the various companies for an enterprise. It provides multiple views for multiple stakeholders.

Major artifacts of the Enterprise Reference Architecture are methodologies, standards, metadata, documents, design patterns, etc.

## Purpose of Reference Architecture

In most cases, architects spend a lot of time researching, investigating, defining, and re-arguing architectural decisions. It is like reinventing the wheel as their peers in other organizations or even the same organization have already spent a lot of time and effort defining their own architectural practices. This prevents an organization from learning from its own experiences and applying that knowledge for increased effectiveness.

Reference architecture provides missing architectural information that can be provided in advance to project team members to enable consistent architectural best practices.

Enterprise Reference Architecture helps an enterprise to achieve the following at the abstract level:

- Reference architecture is more of a communication channel to an enterprise
- Helps the business owners to accommodate to their strategies, vision, objectives, and principles
- Evaluates the IT systems based on Reference Architecture Principles
- Reduces IT spending through increasing functionality, availability, scalability, etc
- A Real-time Integration Model helps to reduce the latency of the data updates
- Is used to define a single source of Information
- Provides a clear view on how to manage information and security
- Defines the policy around the data ownership, product boundaries, etc.

- Helps with cost optimization across project and solution portfolios by eliminating unused or duplicate investments and assets
- Has a shorter implementation time and cost

Once the reference architecture is in place, the set of architectural principles, standards, reference models, and best practices ensure that the aligned investments have the greatest possible likelihood of success in both the near term and the long term (TCO).

### Common pitfalls for Telecom Service Providers

Telecom Reference Architecture serves as the first step towards maturity for a telecom service provider. During the course of our assignments/experiences with telecom players, we have come across the following observations – Some of these indicate a lack of maturity of the telecom service provider:

- In markets that are growing and not so mature, it has been observed that telcos have a significant amount of in-house or home-grown applications. In some of these markets, the growth has been so rapid that IT has been unable to cope with business demands. Telcos have shown a tendency to come up with workarounds in their IT applications so as to meet business needs.
- Even for core functions like provisioning or mediation, some telcos have tried to manage with home-grown applications.
- Most of the applications do not have the required scalability or maintainability to sustain growth in volumes or functionality.
- Applications face interoperability issues with other applications in the operator's landscape. Integrating a new application or network element requires considerable effort on the part of the other applications.
- Application boundaries are not clear, and functionality that is not in the initial scope of that application gets pushed onto it. This results in the development of the multiple, small applications without proper boundaries.
- Usage of Legacy OSS/BSS systems, poor Integration across Multiple COTS Products and Internal Systems. Most of the Integrations are developed on ad-hoc basis and Point-to-Point Integration.
- Redundancy of the business functions in different applications
- Fragmented data across the different applications and no integrated view of the strategic data
- Lot of performance Issues due to the usage of the complex integration across OSS and BSS systems

However, this is where the maturity of the telecom industry as a whole can be of help. The collaborative efforts of telcos to overcome some of these problems have resulted in bodies like the TM Forum. They have come up with frameworks for business processes, data, applications, and technology for telecom service providers. These could be a good starting point for telcos to clean up their enterprise landscape.

### Industry Trends in Telecom Reference Architecture

Telecom reference architectures are evolving rapidly because telcos are facing business and IT challenges.

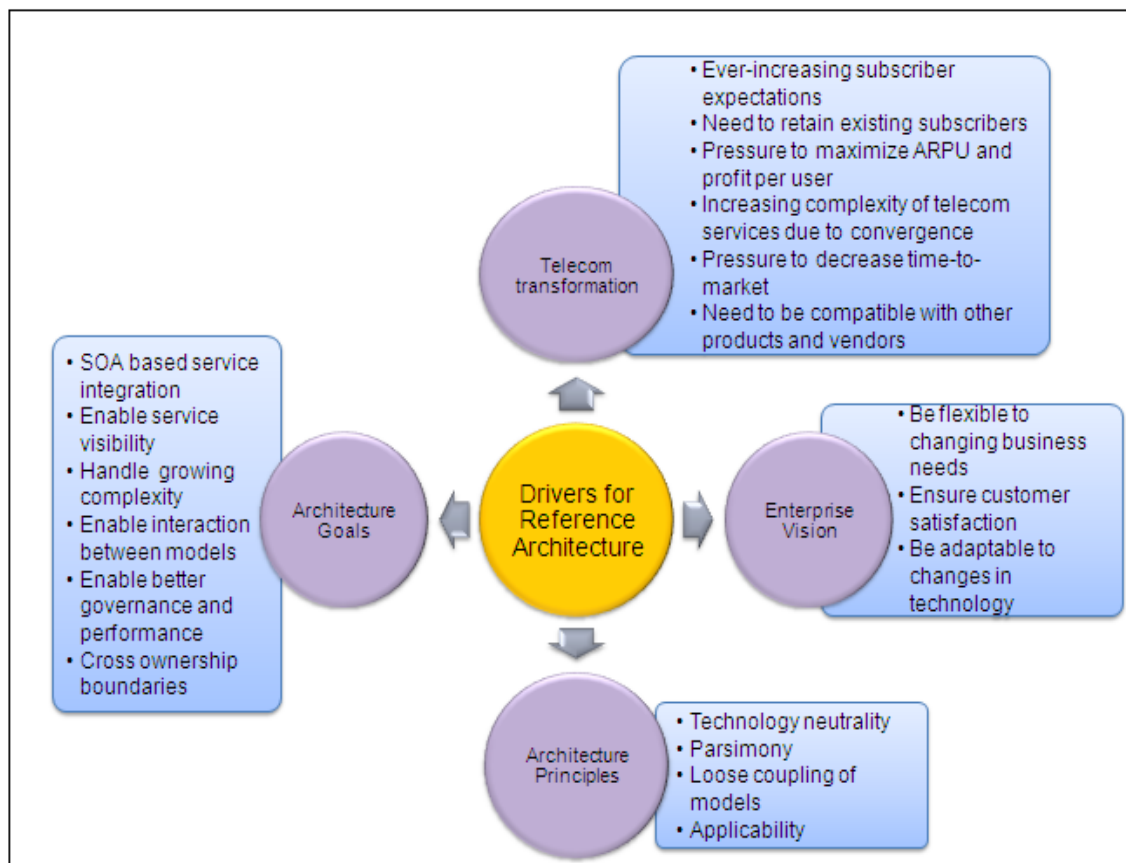
“The reality is that there probably is no killer application, no silver bullet that the telcos can latch onto to carry them into a 21st Century.... Instead, there are probably hundreds – perhaps thousands – of niche applications.... And the only way to find which of these works for you is to try out lots of them, ramp up the ones that work, and discontinue the ones that fail.” – Martin Creaner President & CTO TM Forum [1].

The following trends have been observed in telecom reference architecture:

- Transformation of business structures to align with customer requirements
- Adoption of more Internet-like technical architectures. The Web 2.0 concept is increasingly being used.
- Virtualization of the traditional operations support system (OSS)
- Adoption of SOA to support development of IP-based services [2,3,4]
- Adoption of frameworks like Service Delivery Platforms (SDPs) and IP Multimedia Subsystem (IMS) to enable seamless deployment of various services over fixed and mobile networks [5,6]
- Replacement of in-house, customized, and stove-piped OSS/BSS with standards-based COTS products
- Compliance with industry standards and frameworks like eTOM, SID, and TAM to enable seamless integration with other standards-based products

### Drivers of Reference Architecture

The drivers of the Reference Architecture are Reference Architecture Goals, Principles, and Enterprise Vision and Telecom Transformation. The details are depicted below diagram.



**Figure 1. Drivers for Reference Architecture**

Today's telecom reference architectures should seamlessly integrate traditional legacy-based applications and transition to next-generation network technologies (e.g., IP multimedia

subsystems). This has resulted in new requirements for flexible, real-time billing and OSS/BSS systems and implications on the service provider's organizational requirements and structure.

Telecom reference architectures are today expected to:

- Integrate voice, messaging, email and other VAS over fixed and mobile networks, back end systems
- Be able to provision multiple services and service bundles
- Deliver converged voice, video and data services
- Leverage the existing Network Infrastructure
- Provide real-time, flexible billing and charging systems to handle complex promotions, discounts, and settlements with multiple parties [7].
- Support charging of advanced data services such as VoIP, On-Demand, Services (e.g. Video), IMS/SIP Services, Mobile Money, Content Services and IPTV [8]
- Help in faster deployment of new services
- Serve as an effective platform for collaboration between network IT and business organizations [5,6]
- Harness the potential of converging technology, networks, devices and content to develop multimedia services and solutions of ever-increasing sophistication on a single Internet Protocol (IP)
- Ensure better service delivery and zero revenue leakage through real-time balance and credit management
- Lower operating costs to drive profitability

### Acknowledgements

We would like to thank Mandar Vanarse & Dr. Udaya Bhaskar Vemulapati for giving us the opportunity to work in this area and also for providing us the valuable inputs in the form of review observations.

### Authors

Dr. Gopala Krishna Behara is an Senior Enterprise Architect, EAC in the Wipro Consulting Services division of Wipro. He has around 14 yrs of total experience in IT and can be reached at [gopalkrishna.behara@wipro.com](mailto:gopalkrishna.behara@wipro.com).

Prasad Palli is an Senior Manager, EAC in the Wipro Consulting Services division of Wipro. He has around 13 yrs of total experience in IT and can be reached at [prasad.palli@wipro.com](mailto:prasad.palli@wipro.com).

Pradyumna Mahajani is a Senior Consultant, EAC in the Wipro Consulting Services division of Wipro. He has around 6 yrs of total experience in IT and can be reached at [pradyumna.mahajani@wipro.com](mailto:pradyumna.mahajani@wipro.com).

### Disclaimer

The views expressed in this article/presentation are that of author and Wipro does not subscribe to the substance, veracity or truthfulness of the said opinion.

### BPTrends LinkedIn Discussion Group

We recently created a BPTrends Discussion Group on LinkedIn to allow our members, readers and friends to freely exchange ideas on a wide variety of BPM related topics. We encourage you to initiate a new discussion on this publication or on other BPM related topics of interest to you, or to contribute to existing discussions. Go to LinkedIn and join the **BPTrends Discussion Group**.